

Stepwise approach for Reference levels and carbon Measurement for REDD+



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Framework for national REDD+ monitoring

National forest monitoring (i.e. carbon)



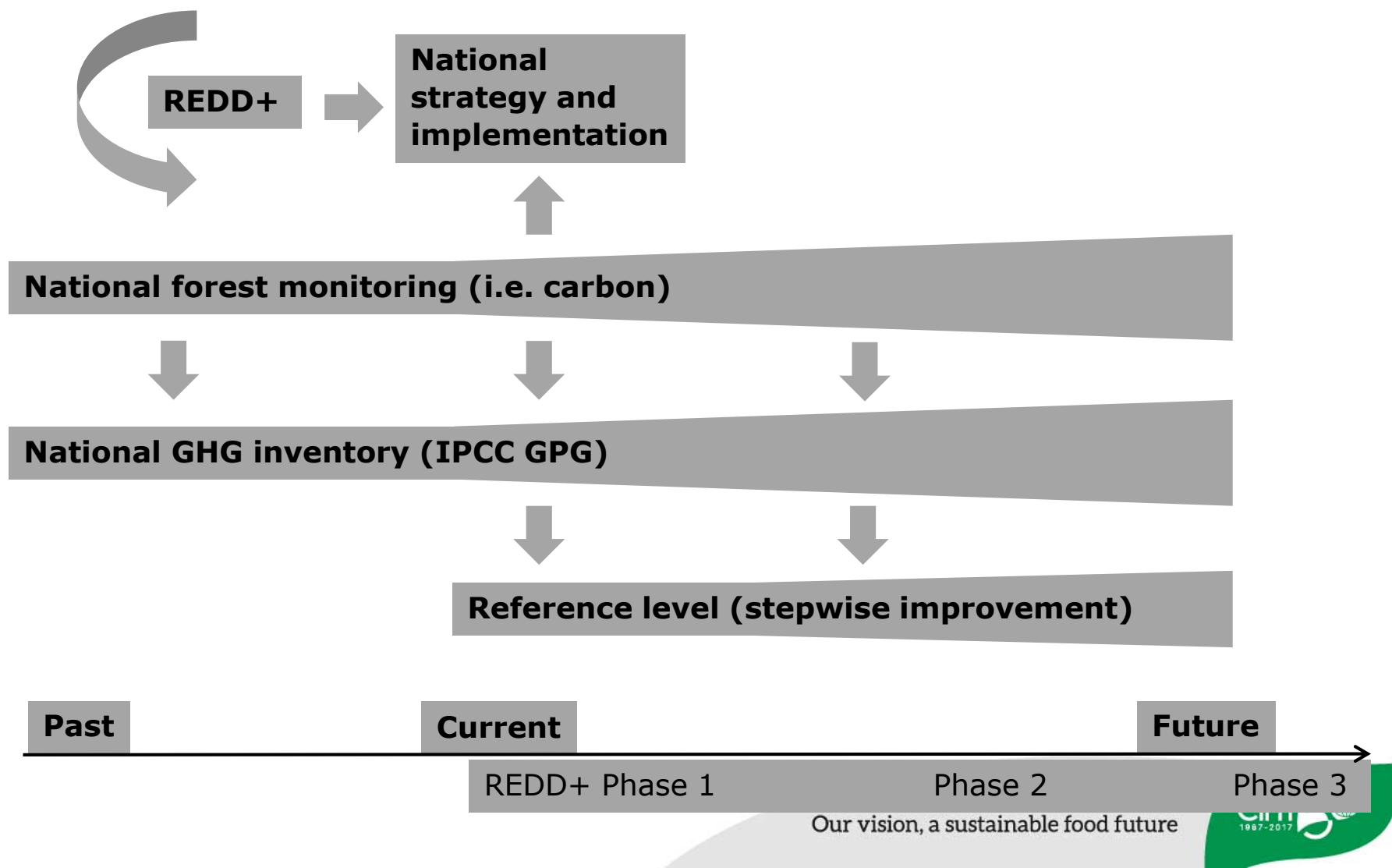
National GHG inventory (IPCC GPG)

Past

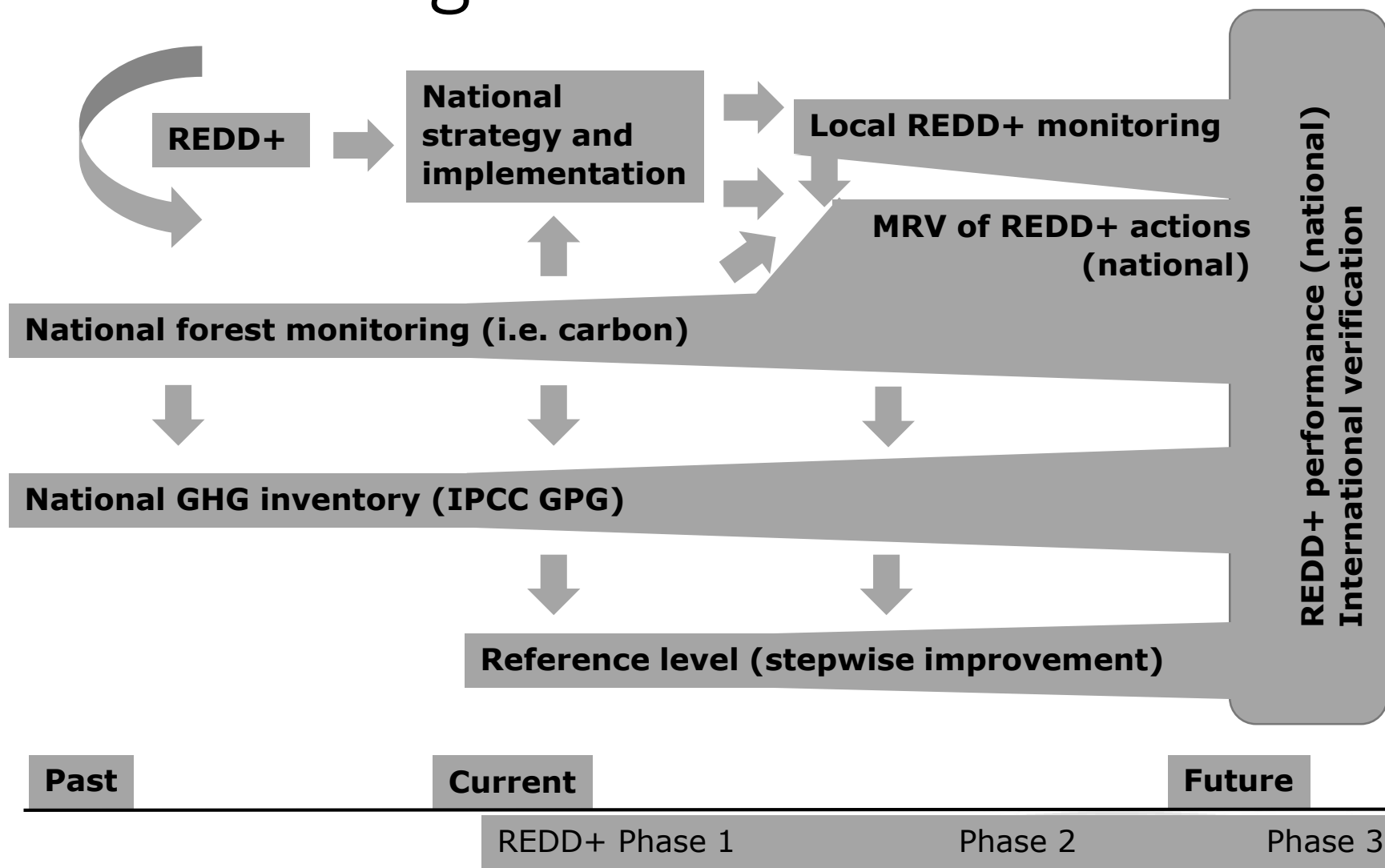
Current

Future

Framework for national REDD+ monitoring



Framework for national REDD+ monitoring

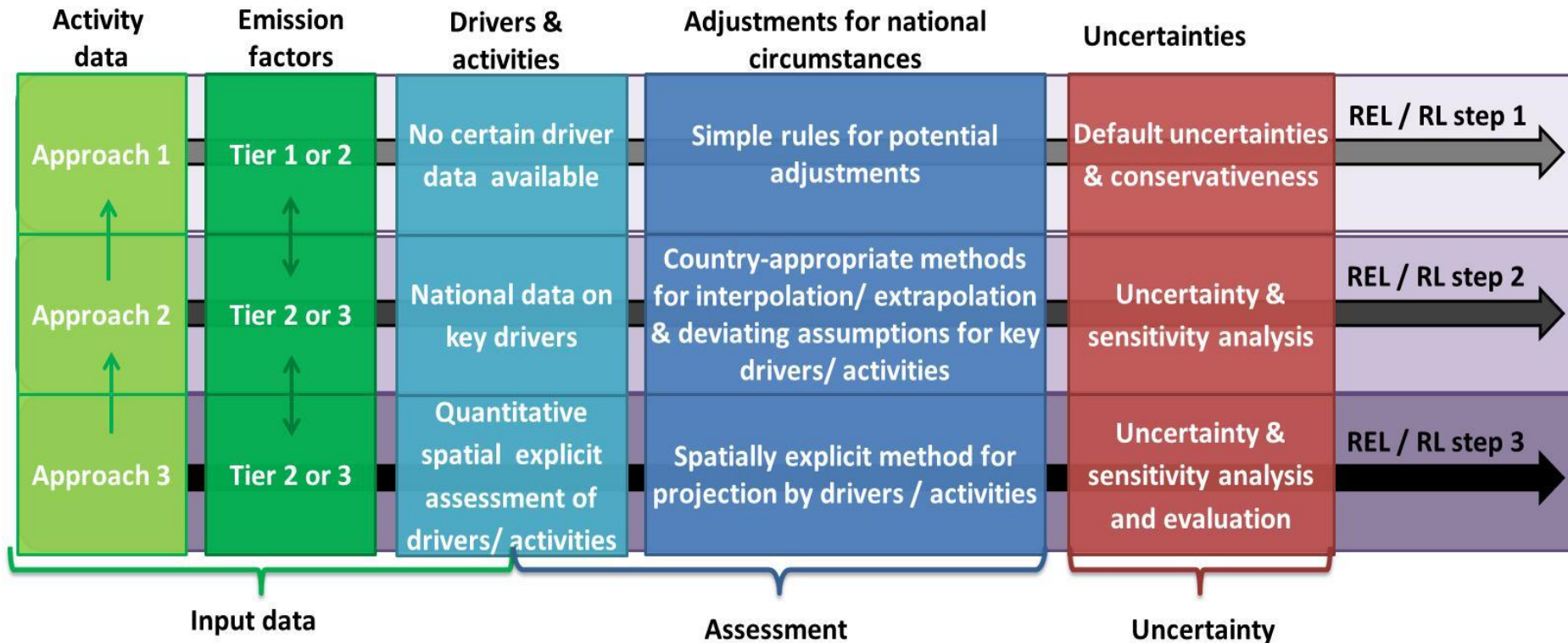


Developing REDD+ reference levels

- **REL first key “number” to be provided by REDD+ countries**
- **Historical data and understanding forest change patterns and underlying causes are important**
 - to take national circumstances into account,
 - to construct scenarios that deviate from historical trends
- **The availability of data including those of drivers is uncertain in many REDD+ countries**
 - Stepwise approach as starting point to match available data and their quality with the choice of reference level methods, its uncertainties and country circumstances

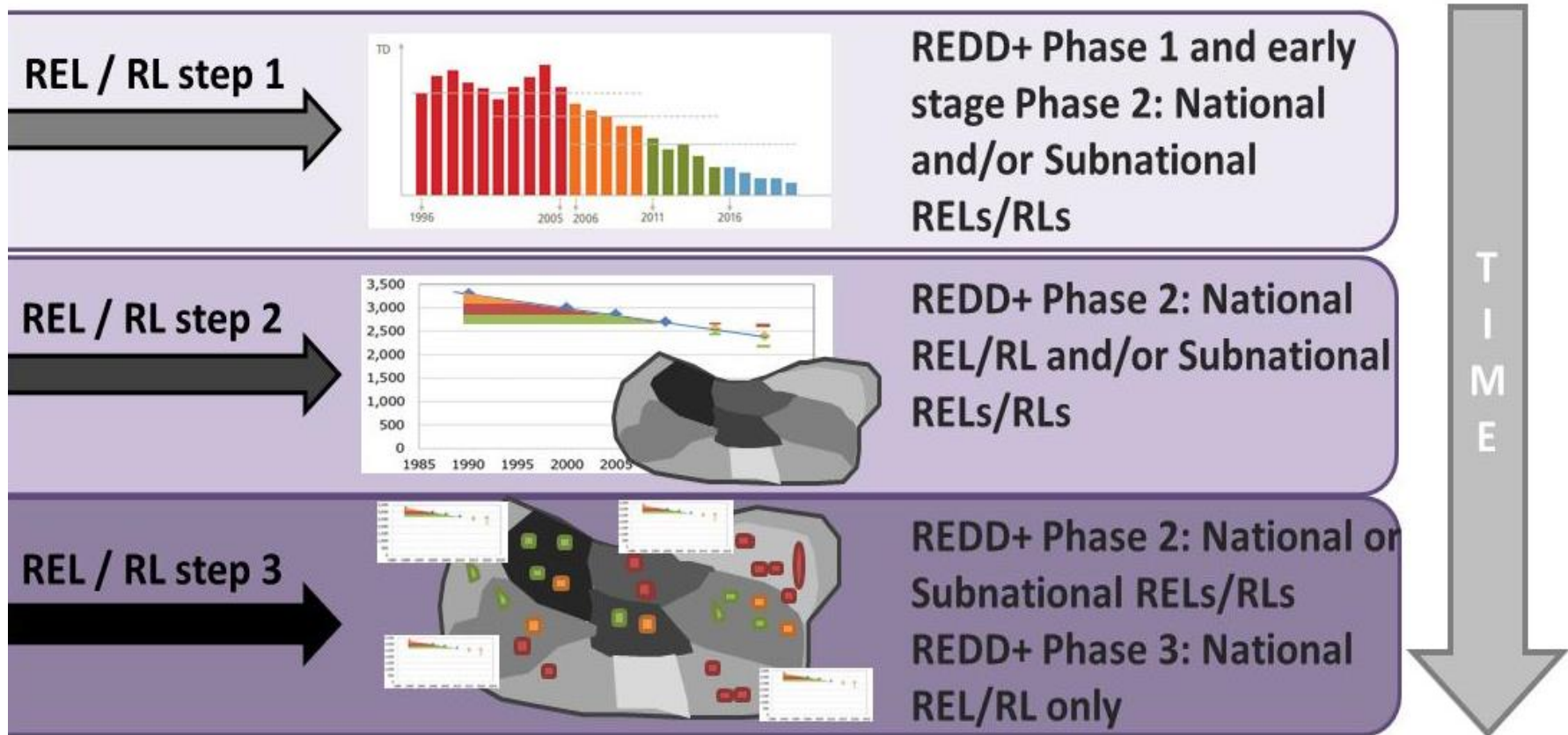
Overview of a step-wise approach for RELs

Source: Herold et al., 2012, CIFOR policy brief



- Availability & quality of data should determine the methods to develop reference levels

Criteria for comparing country circumstances and strategies



Activity data: 3 IPCC approaches

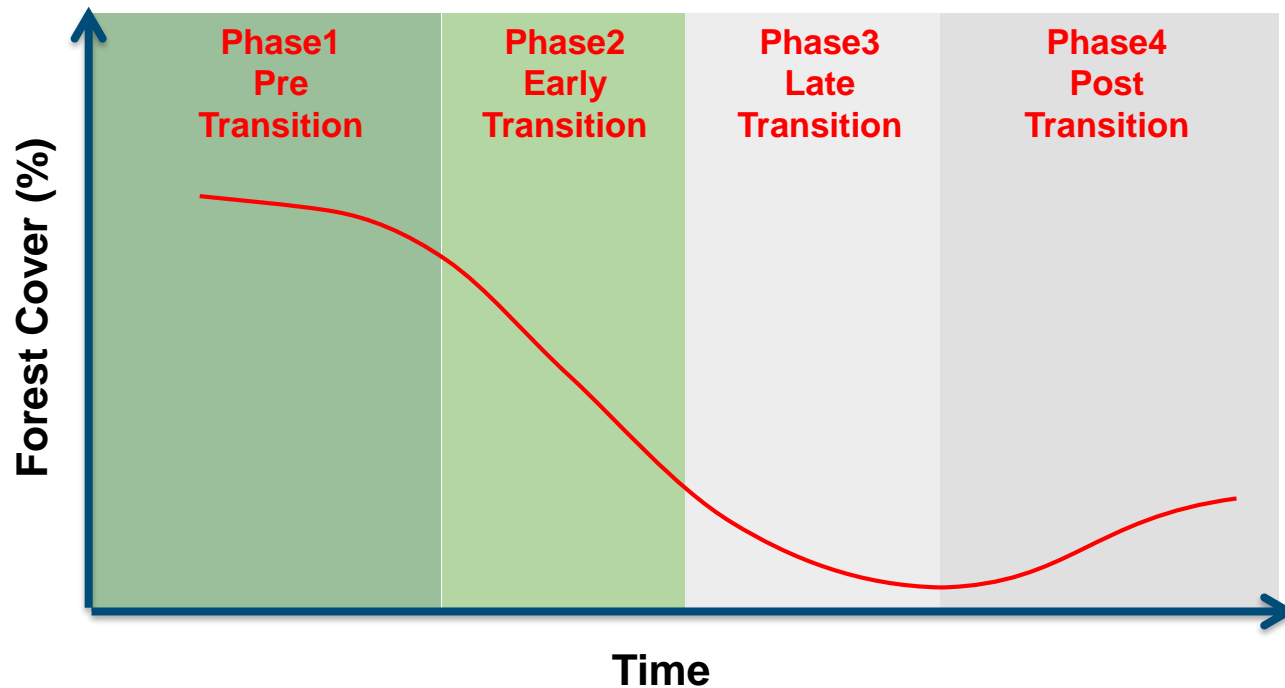
	Approach 1	Approach 2	Approach 3
Data on forest change (or emissions) following IPCC approaches	TOTAL LAND-USE AREA, NO DATA ON CONVERSIONS BETWEEN LAND USES Example: FAO FRA data	TOTAL LAND-USE AREA, INCLUDING CHANGES BETWEEN CATEGORIES Example: National level data on gross forest changes through a change matrix (i.e. deforestation vs. reforestation), ideally disaggregated by administrative regions	SPATIALLY-EXPLICIT LAND-USE CONVERSION DATA Example: data from remote sensing

Three levels of emission factors

- Tier 1 methods are designed to be the simplest to use, for which equations and default parameter values (e.g., emission and stock change factors) are provided by IPCC Guidelines.
- Tier 2 can use the same methodological approach as Tier 1 but applies emission and stock change factors that are based on country- or region-specific data
- Tier 3, higher order methods are used, including models and inventory measurement systems tailored to address national circumstances, repeated over time, and driven by high-resolution activity data and disaggregated at sub-national level.

Changes of Deforestation Drivers:

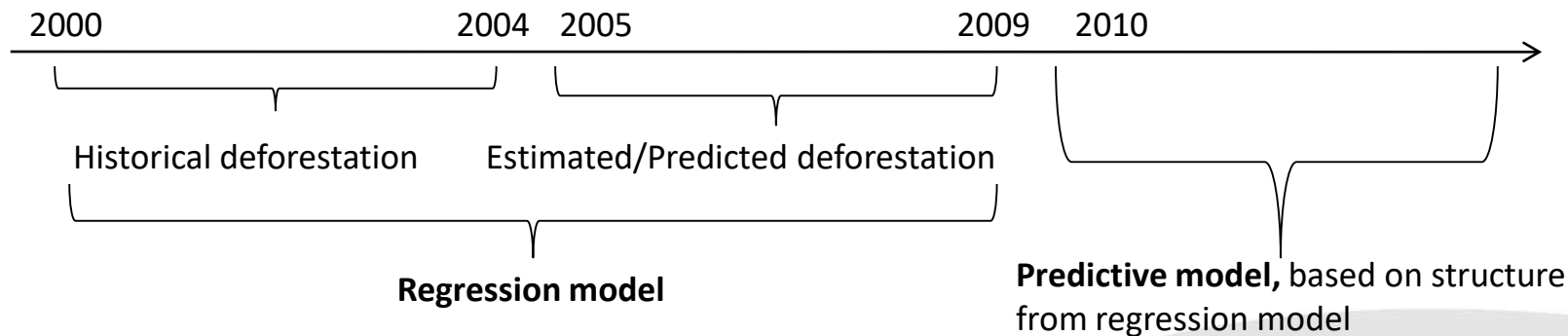
Important for assessing historical deforestation



Using national data from 46 countries: REDD-related data and publications

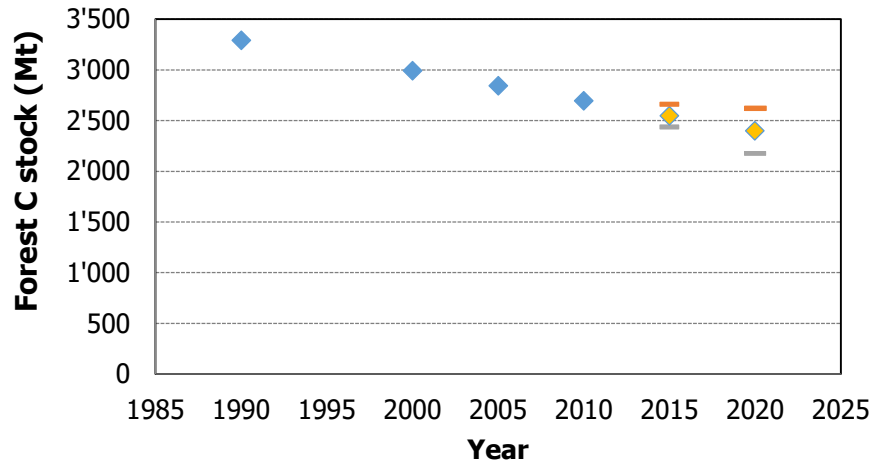
RLs using regression models

- Simple, easy to understand and test new variables
- But, data demanding
- Predicting deforestation in a period: $P_t - P_{t+1}$, based on deforestation in the previous period $P_{t-1} - P_t$ and a set of other factors (observed at time t).
- Using structure (coefficients) from the estimated regression equation to predict deforestation in period $P_{t+1} - P_{t+2}$, based on observed values at time $t+1$

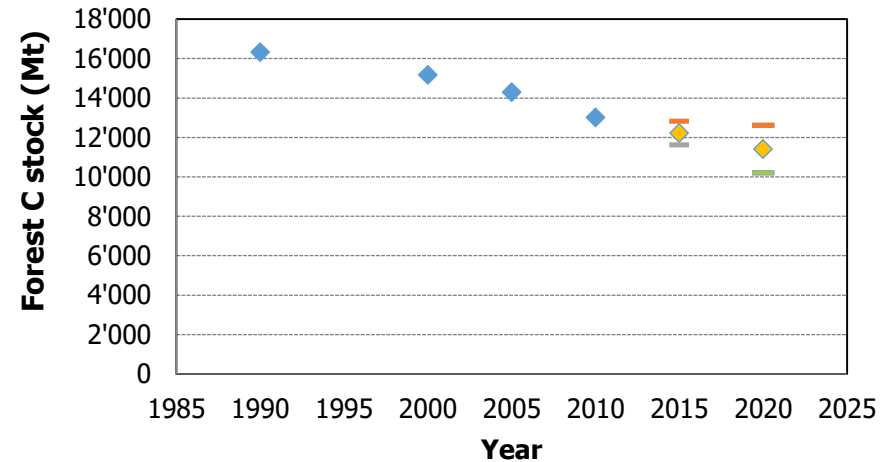


Step 1 case for 4 countries using FAO FRA data

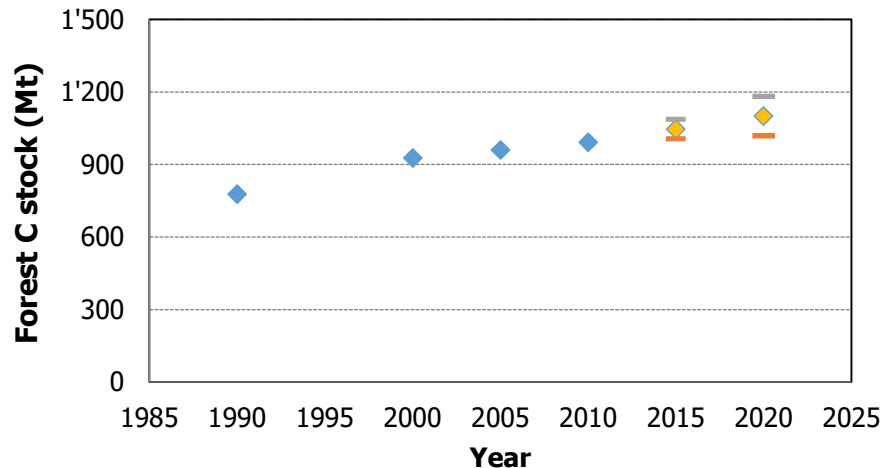
Cameroon



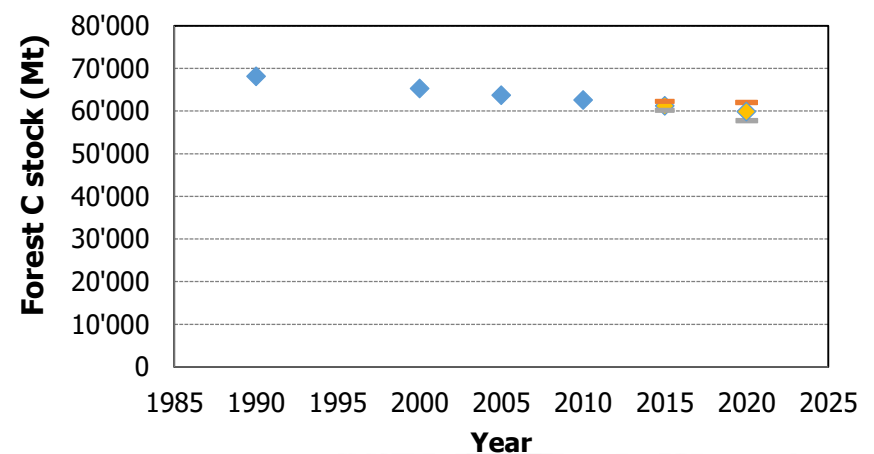
Indonesia



Vietnam



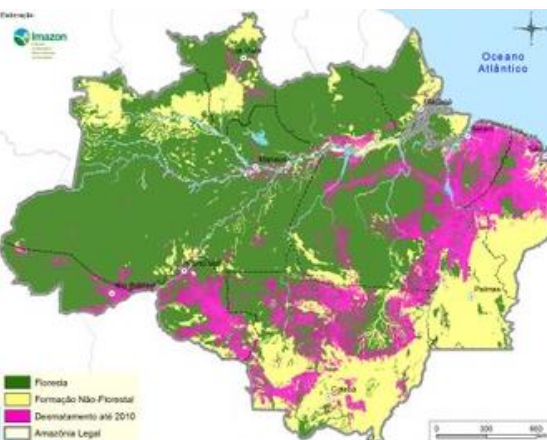
Brazil



Step 2: Brazil

Predict deforestation
rates for legal
Amazon
2005- 2009

Category	Regression coefficient	
Deforestation rate (2000-2004)	0.395	
Trend variable	-0.136	-0.145
Deforestation dummy	-0.373	-0.773
Forest stock	2.18	4.756
Forest stock squared	-1.8	-3.826
Log per capita GDP	-0.034	-0.13
Agric GDP (%GDP)	0.28	0.28
Population density	0.081	-0.81
Road denisty	0.039	0.076
R²	0.831	0.789
N	3595	3595

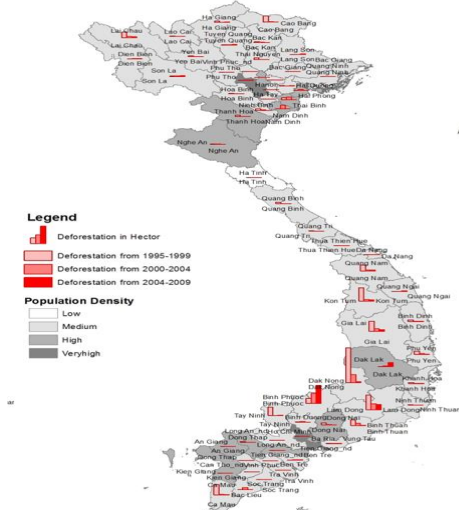


Step 2: Vietnam

Predict deforestation
rates
2005- 2009

Category	Regression coefficient	
Deforestation rate (2000-2004)	01.464	
Trend variable	-0.006	0.003
Deforestation dummy	-0.011	-0.031
Forest stock	0.067	0.260
Forest stock squared	-0.189	-0.463
Population density	-1.177	1.036
Road denisty	0.004	-0.001
R ²	0.515	0.052
N	301	301

Deforestation in Vietnam





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